POLISH POLAR RESEARCH	10	3	429—442	1989

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Geochemical characteristics of Hoglandvatnet and Ålandvatnet, central Spitsbergen

ABSTRACT: The Hoglandvatnet and Ålandvatnet are genetically associated with the action of a large ice stream issuing from Mittag-Lefflerbreen towards Łomonosovfonna as far nortwards as Austfjorden. The accomplished investigations permit water properties to be described for Hoglandvatnet and Ålandvatnet, as well as the chemical composition of the basin waters to be correlated with lithologic diversity of the surrounding massifs and the composition of glacier water feeding them.

Water of Hoglandvatnet has a rather uniform ion composition. It is sulphate-calcium water. Low mineral contents of glacier water and that flowing through crystalline rocks of Framstaken and feeding the basin result in its less marked effect on the Hoglandvatnet water, compared with highly mineralized water of streams issuing from Trikolorfjellet and Tarantellen.

Water of Ålandvatnet has a somewhat different quantitative ion composition than that of Hoglandvatnet. It is calcium-sulphate-bicarbonate water which is richer in the bicarbonate ion than the Hoglandvatnet waters. This is most likely due to the influence of bicarbonate water of Ålandelva and glacier water feeding the basin. It can also be the result of a smaller contribution from highly mineralized calcium-sulphate water issuing from Trikolorfjellet.

Key words: Arctic, Spitsbergen, lake water chemistry.

Introduction

The Hoglandvatnet and Ålandvatnet are genetically associated with the action of a large ice stream issuing from Mittag-Lefflerbreen towards Łomonosovfonna as far northwards as Austfjorden (Figs 1—2; Stankowski 1989).

Hoglandvatnet abouts in the north against lateral glacier ice of streams turing westwards from Mittag-Lefflerbreen. The basin is bordered in the west and partially in the south by Palaeozoic sedimentary rocks massifs of Trikolor-

fjellet and Tarantellen (the northern extermity of Gizehfjellet). The McWhaebreen surrounds the lake in the southeast; and the Framstaken built of crystalline rocks surrounds the lake in the east.

Ålandvatnet is bordered in the east by lateral streams issuing from Mittag-Lefflerbreen and marginal landforms. The basin adjoins Odellfjellet and Sentinelfjellet in the northwest and west, respectively. These are massives built up of late Palaeozoic sedimentary rocks with the nests of crystalline rocks. The Cambridgebreen snout and the northern fringes of the Trikolorfjellet massif surround the lake in the south. Ålandvatnet is also fed by Ålandelva and an intense water stream from Hoglandvatnet and running between the eastern base of Trikolorfjellet and Mittag-Lefflerbreen.

The objective of this study is to describe properties of the waters of Hoglandvatnet and Ålandvatnet. Investigations of the chemical composition of the basin waters and their tributaries have provided data which enable the chemistry of water to be correlated with lithologic diversity of massifs surrounding the basins and the composition of glacier water streams.

The cold summer of 1987 offered a lot of obstacles to the research. As Hoglandvatnet did not thaw completely, it was impossible to sample surface water from the centre of the basin, take water from lake depths and collect sediments from the basin bottom. In both basins surface water was sampled around shores. Surface water samples were also taken from the tributaries. Deposits laid down by them were also sampled. Figures 1 and 2 show sampling sites.

The chemical composition of water was immediately identified in the field and at the base station. Study was made of hydrogen ion concentration, electrolytic conductivity, the concentration of ions of calcium, magnesium, sulphate and chloride, as well as alkalinity measured by the use of phenolphthalein and methyl orange (Markowicz and Pulina 1979; Minczewski and Marczenko 1985). Alkalinity was taken as the basis for estimating the concentration of bicarbonate and carbonate ions (Hermanowicz 1984). The sum of sodium and potassium cations resulted from a difference between the amount of anions and the sum of calcium and magnesium cations. Because of the identification of sodium and potassium ion concentrations in a few selected samples by means of the flame photometry method, approximate quantitative ratios between sodium and potassium could be calculated. The samples were investigated in the laboratory of the Quaternary Research Institute of the Adam Mickiewicz University. The total solids were also identified in these samples. In addition to conductivity, they served as a measure of water mineralization.

Deposits laid down by the gullies were subjected to thermal analysis made in natural samples with a derivatograph device according to the system by Paulik, Paulik and Erdey. The weighed portion of 1 g was used at the

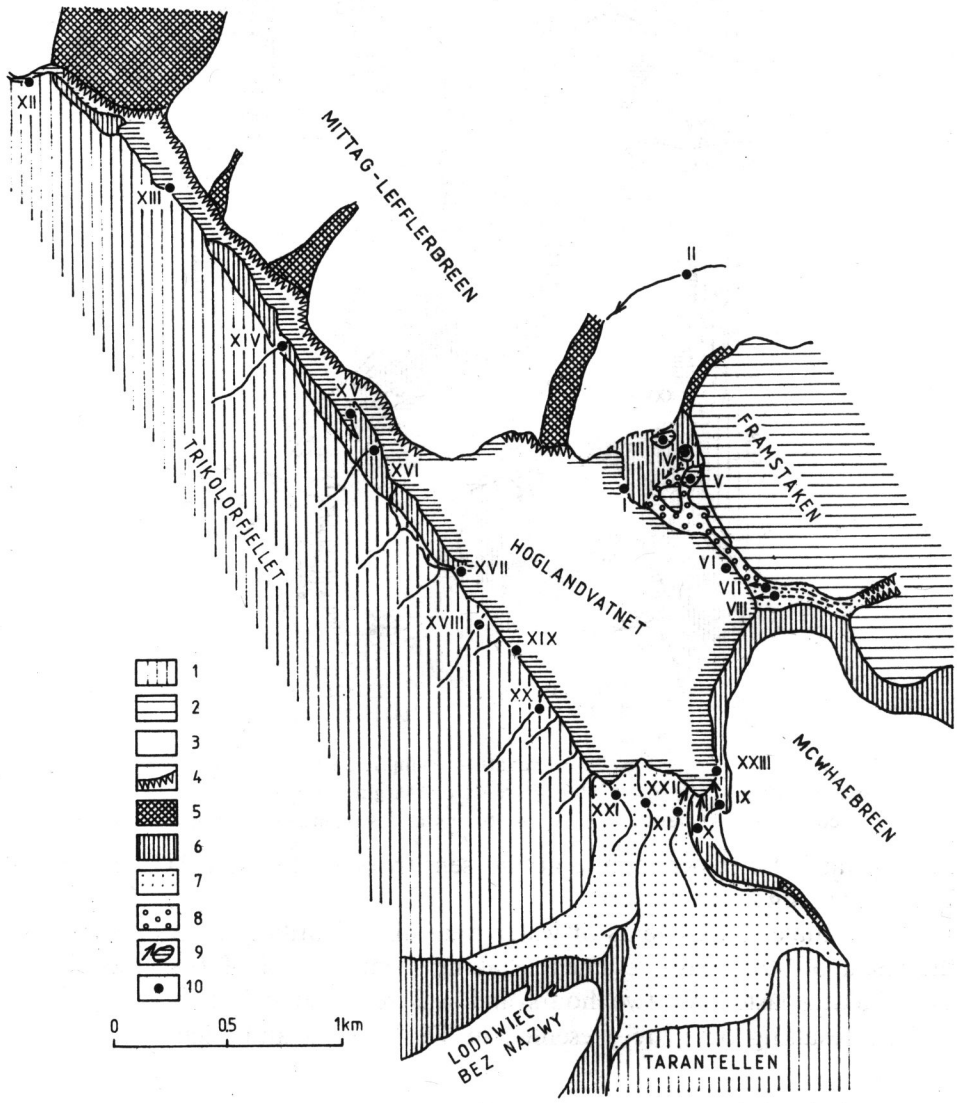


Fig. 1. Hoglandvatnet: sampling sites
1: sedimentary rocks, 2: metamorphosed rocks, 3: glaciers, 4: ice cliff, 5: morainic material over glacier ice, 6: relief of marginal zones, 7: talus cones, alluvial fans and outwash plains, 8: raised marine terraces, 9: streams and water basins, 10: sampling sites

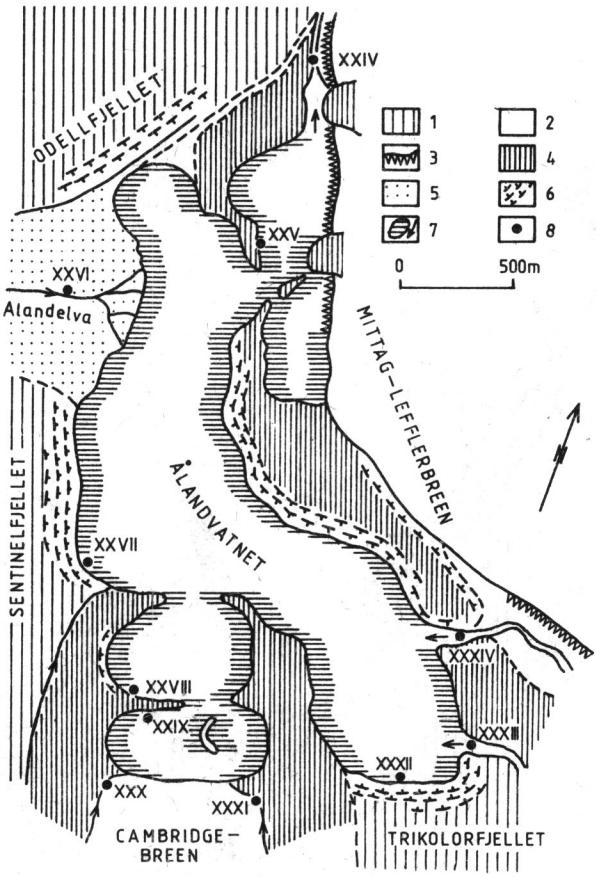


Fig. 2. Ålandvatnet: sampling sites
1: rock massifs, 2: glaciers, 3: ice cliff, 4: relief of marginal zones, 5: aqueous accumulation cones, 6: lake terraces, 7: water basins and streams, 8: sampling sites

heating rate of 11° per minute at the sensitivity of DTA, DTG of 1/5 and TG of 200 mg.

The soluble salt contents of water were also identified in an extract being the result of 30-g-heavy sediment shaking from 150 ml of bidistilled water. The shaking lasted for two hours and was repeated twice.

The resulting data are presented in Tables 1—3 and Figures 3—6.

Research results

Water of Hoglandvatnet and its tributaries

The water of Hoglandvatnet has a rather uniform ion composition. It is generally sulphate-calcium water. Calcium and sodium ions occurring in

Table 1

Chemical properties of the waters of Hoglandvatnet and its tributaries

Sample No.	Sampling site	Sampling date	Air temperature °C	Water temperature °C	pH	κ25°C mSm^{-1}	Total solids mgdm^{-3}	Cations mvdm^{-3}			Anions mvdm^{-3}			
								Ca^{++}	Mg^{++}	$Na^{+}+K^{+}$	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}
	Hoglandvatnet:													
I		12.07.87	5.0	0.8	6.9	6.8	40	0.46	0.34	0.70	0.0	0.50	0.14	0.86
VI	eastern portion	12.07.87	6.8	1.6	7.9	15.5	—	1.24	0.58	1.32	0.0	0.85	0.19	2.10
XXIII		13.07.87	3.5	1.0	7.6	16.0	—	1.46	0.26	1.01	0.0	0.80	0.19	1.74
XIX		13.07.87	1.4	0.4	7.3	13.0	—	0.90	0.10	0.59	0.0	0.50	0.15	0.94
XVII		13.07.87	3.5	0.2	7.4	12.0	—	0.84	0.60	0.71	0.0	0.65	0.18	1.32
XV	western portion	13.07.87	2.2	0.6	7.5	14.0	100	1.11	0.23	1.00	0.0	0.75	0.19	1.40
XIII		13.07.87	3.2	1.0	7.1	15.0	—	0.88	0.34	1.05	0.0	0.55	0.16	1.56
XII		13.07.87	3.0	0.8	7.1	19.0	—	1.43	0.35	1.08	0.0	0.82	0.22	1.82
	Hoglandvatnet tributaries:													
II	northern	12.07.87	3.8	0.2	6.9	2.8	30	0.03	0.41	0.66	0.0	0.35	0.23	0.52
VII	eastern	12.07.87	5.6	1.2	7.2	4.0	30	0.18	0.36	0.83	0.0	0.60	0.19	0.58
VIII		12.07.87	4.8	0.4	—	10.2	—	0.74	0.56	1.21	0.0	1.15	0.28	1.08
IX		12.07.87	4.8	0.4	7.4	65.0	—	5.48	1.10	0.63	0.0	1.15	0.22	5.84
X	southern	12.07.87	4.7	0.2	7.6	49.0	390	4.22	0.56	0.69	0.0	1.00	0.43	4.04
XI		12.07.87	4.8	2.5	7.6	41.0	320	3.38	0.64	0.77	0.0	1.20	0.27	3.32
XXII		13.07.87	3.2	0.4	7.7	19.0	—	1.50	0.42	1.14	0.0	1.20	0.30	1.56
XXI		13.07.87	2.7	1.3	7.5	62.0	—	5.78	0.88	1.11	0.0	1.15	0.26	6.36
XX		13.07.87	3.7	1.8	7.2	64.0	550	6.27	0.51	0.28	0.0	0.90	0.18	5.98
XVIII	western	13.07.87	3.7	0.7	7.4	134.0	—	14.72	1.04	0.59	0.0	1.10	0.23	14.90
XVI		13.07.87	3.6	2.4	7.4	107.0	990	11.10	0.68	1.25	0.0	1.35	0.30	11.38
XIV		13.07.87	3.2	2.4	7.1	97.0	—	9.60	0.70	0.75	0.0	1.30	0.31	9.44
III	morainic lakes between	12.07.87	1.4	3.6	7.3	3.8	—	0.16	0.30	0.58	0.0	0.52	0.18	0.34
IV	Hoglandvatnet and	12.07.87	2.8	5.0	7.7	8.1	—	0.44	0.58	0.99	0.0	085	0.26	0.90
V	Framstaken	12.07.87	2.0	2.2	7.4	7.4	50	0.34	0.70	0.86	0.0	0.85	0.27	0.78

similar amounts are the main cations found in the water. Anions include sulphate ions and a great contribution from the bicarbonate ion (Tab. 1, Figs 3 and 4).

There is a marked decline in the mineral contents of the Hoglandvatnet water in sample I derived from the north-eastern portion of the basin. It is presumably due to the influence of the Mittag-Lefflerbreen water and scouring-resistant crystalline rocks of Framstaken.

The ion composition of lake tributaries running from the Trikolorfjellet massif (samples XIV, XVI, XVIII, XX, XXI) and Tarantellen in the south (samples XXII, XI, X, IX) is dominated by calcium and sulphate ions. High values of electrolytic conductivity and the sum of cations and anions are indicative of high mineral contents of water feeding Hoglandvatnet from the west and south. The southern creeks running across extensive outwash plains and the marginal zone of the McWhaebreen have somewhat lower mineral contents than water flowing from Trikolorfjellet.

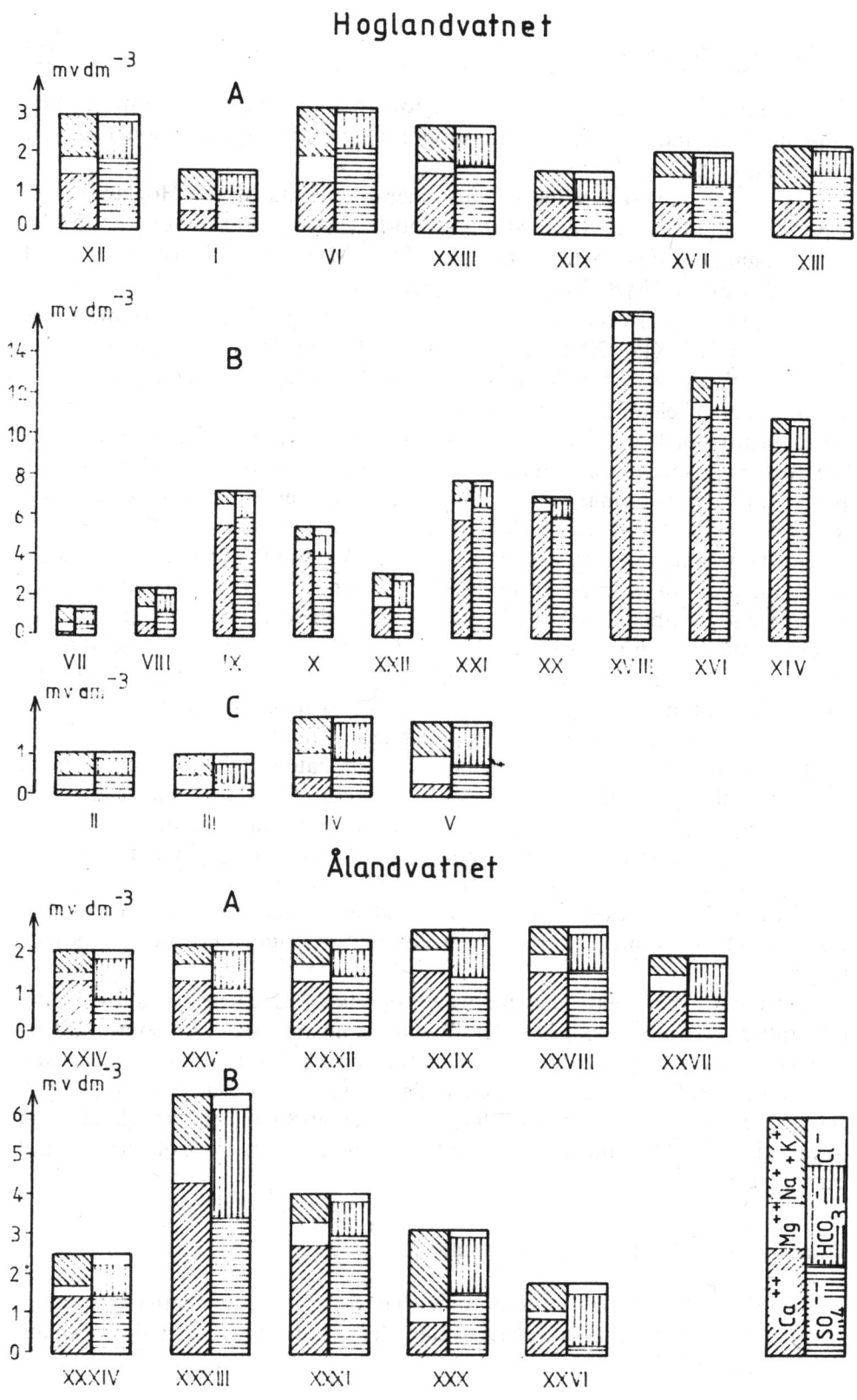
Feeders running from the east (samples VII and VIII) have markedly lower mineral contents and a different ion composition, compared with the western and southern feeders. In sample VIII there are similar amounts of calcium, magnesium and sodium cations, as well as sulphate and bicarbonate anions. It is a sample of water derived from a creeks issuing from McWhaebreen. It contains a large amount of red suspended material. The water is referred to as sodium-bicarbonate-sulphate water.

In sample VII taken from sodium-bicarbonate-sulphate water as well, there are still lower calcium ion contents observable. Sodium and magnesium cations, as well as bicarbonate and sulphate anions occur in identical amounts. The sample is derived from a stream issuing from Mittag-Lefflerbreen and forcing its way through Framstaken. A similar composition is characteristic of morainic lakes present between Hoglandvatnet and Framstaken (samples III, IV, V). They are occupied by sodium-magnesium-sulphate-bicarbonate water.

In summary sulphate-calcium water of Hoglandvatnet is fed by highly mineralized calcium-sulphate water flowing from the west and south and by easterly-running glacier water richer in bicarbonate, sodium and magnesium ions. Because of low mineral contents, glacier water and that flowing through crystalline rocks of Framstaken has a slighter effect on the Hoglandvatnet water than highly mineralized feeders issuing from Trikolorfjellet and Tarantellen.

Water of Ålandvatnet and its tributaries

Water of Ålandvatnet has a somewhat different quantitative ion composition from the Hoglandvatnet water. It is calcium-sulphate-bicarbonate water (Tab. 2, Figs 3, 5).


Hoglandvatnet
mv dm⁻³
A
3
2
1
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XII
I
VI
XXIII
XIX
XVII
XIII
mv dm⁻³
B
14
12
10
8
6
4
2
0
VII
VIII
IX
X
XXII
XXI
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XVIII
XVI
XIV
mv dm⁻³
C
1
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Ålandvatnet
mv dm⁻³
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XXIV
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XXXII
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XXVII
mv dm⁻³
B
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XXXIV
XXXIII
XXXI
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XXVI
Ca++
Mg++
Na+ +K+
Cl⁻
HCO3⁻
SO4⁻⁻

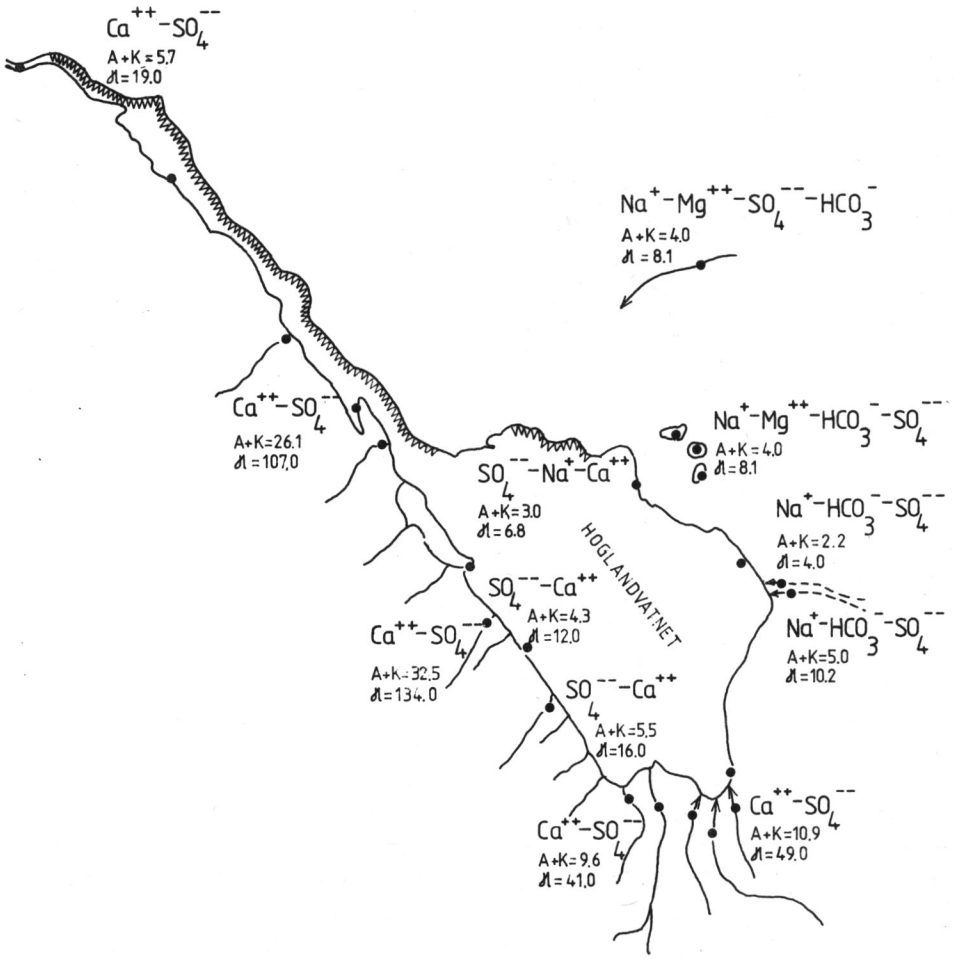

Fig. 3. Ion composition of the waters of Hoglandvatnet and Ålandvatnet and their feeders A: waters of Hoglandvatnet and Ålandvatnet, B: waters entering Hoglandvatnet and Ålandvatnet, C: supraglacial river issuing from Mittag-Lefflerbreen (no. II), morainic lakes between Hoglandvatnet and Framstaken (nos III, IV, V)

Fig. 4. Hoglandvatnet: chemical types, mineral contents and electrolytic conductivity of water A+K sum of anions and cations, mvdm^{-3}, κ electrolytic conductivity at 25°C. mSm

Chemical properties of the waters

Sample No.	Sampling site	Sampling date	Air temperature °C	Water temperature °C	pH	$\kappa_{25\,C}$ mSm^{-1}
	Ålandvatnet:					
XXIV	north-eastern portion	23.07.87	2.5	1.0	7.4	14.0
XXV		23.07.87	2.1	1.0	7.2	13.8
XXXII	south-eastern portion	23.07.87	1.8	0.4	7.2	15.2
XXIX	south-western portion	23.07.87	1.9	0.4	7.2	18.6
XXVIII		23.07.87	2.1	0.7	7.3	17.0
XXVII	western portion	23.07.87	2.0	0.8	7.2	13.2
	Ådlandvatnet tributaries:					
XXXIV	eastern	23.07.87	2.8	0.2	7.2	15.6
XXXIII		23.07.87	2.7	4.0	7.5	54.0
XXXI	southern	23.07.87	1.9	0.1	7.3	28.5
XXX		23.07.87	2.3	0.2	7.3	11.4
XXVI	Ålandelva	23.07.87	2.7	1.5	7.3	9.2

The calcium ion is the main cation contained in the water. It assumes dominance over sodium and magnesium cations. Calcium and sodium ions occur in similar amounts in the Hoglandvatnet water. In surface water in the southern portion of Ålandvatnet (samples XXXII, XXIX, XXVIII) the sulphate anion has gained an advantage over the bicarbonate anion, as is the case for Hoglandvatnet. In other portions of the lake basin, *i.e.* the western (sample XXVII) and north-eastern (samples XXIV, XXV) portions, sulphate and bicarbonate ions occur in equal amounts (Tab. 2, Fig. 3).

The mineral contents of Ålandvatnet water which are rather uniform become increased in newly formed small bays in the south-western portion of the lake (samples XXVIII, XXIX). The bays that are the product of intense retreat of the Cambridgebreen and Balliolbreen snouts are fed by glacier water. The eastern water stream issuing from Cambridgebreen in vicinity to the Trikolorfjellet massif (sample XXXI) contains calcium and sulphate, and remains highly mineralized. Still higher mineral contents are characteristic of creeks issuing from Trikolorfjellet and reaching the south--eastern extremity of Hoglandvatnet (sample XXXIII). They contain calcium and sulphate with a great contribution from the bicarbonate ion.

The analysis of the Ålandvatnet tributaries reveals low mineral contents of Ålandelva waters (sample XXVI). The bicarbonate anion and the calcium and sodium cations are the main ions.

Table 2

of Ålandvatnet and its tributaries

Total solids $mgdm^{-3}$	Cations $mvdm^{-3}$			Anions $mvdm^{-3}$			
	Ca^{++}	Mg^{++}	$Na^{+}+K^{+}$	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}
—	1.26	0.22	0.60	0.0	1.00	0.24	0.84
—	1.26	0.38	0.61	0.0	0.95	0.20	1.10
140	1.28	0.44	0.63	0.0	0.70	0.23	1.42
—	1.60	0.46	0.57	0.0	1.00	0.21	1.42
160	1.52	0.38	0.81	0.0	0.95	0.20	1.56
110	1.12	0.34	0.53	0.0	0.85	0.24	0.90
120	1.46	0.14	0.85	0.0	0.75	0.20	1.50
440	4.28	0.78	1.40	0.0	2.70	0.40	3.36
280	2.70	0.64	0.72	0.0	0.85	0.27	2.94
120	0.80	0.36	1.99	0.0	1.40	0.23	1.52
—	0.90	0.14	0.71	0.0	1.30	0.21	0.24

The mineral contents of Ålandvatnet water are similar to those of the Hoglandvatnet water (electrolytic conductivity, the sum of cations and anions).

Water issuing from Hoglandvatnet (sample XII) has somewhat higher mineral contents than water entering Ålandvatnet (sample XXXIV) as a stream linking the two basins. This is due to a marked effect of the Mittag-Lefflerbreen water on the flowing stream. Along this section there are scanty streams issuing from Trikolorfjellet.

The chemical analysis of the Ålandvatnet waters and its tributaries shows clearly the influence of lithology of the surrounding massifs on the one hand and glacier water on the other hand. This is also the case for Hoglandvatnet. Spatial variations of Ålandvatnet water result from the influence of water feeding the basin. In the western portion of the lake, Ålandelva water with low mineral contents contains bicarbonate and calcium. The southern part of the lake is fed by the Cambridgebreen and Balliolbreen water and that flowing from Trikolorfjellet. The waters contain calcium and sulphate, and remain highly mineralized. In the southeast the lake is fed by an intense stream of calcium-sulphate water issuing from Hoglandvatnet. The water has somewhat lower mineral contents than that flowing from Hoglandvatnet. The north-eastern part of the lake is fed by the Mittag-Lefflerbreen waters.

Water of Ålandvatnet is richer in the bicarbonate ion than that of

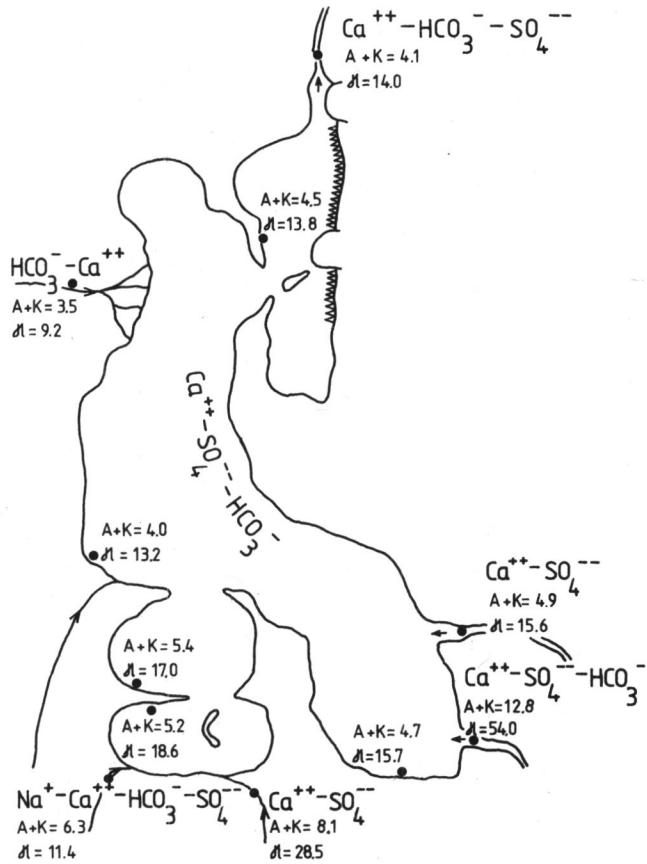

Fig. 5. Ålandvatnet: chemical types, mineral contents and electrolytic conductivity A+K sum of anions and cations, mvdm ^{3}, $\varkappa$ electrolytic conductivity at 25°C, mSm $^{-1}$

Hoglandvatnet. It is presumably due to the influence of bicarbonate-bearing Ålandelva water and glacier water feeding the basin, as well as a small contribution from highly mineralized calcium-sulphate feeders issuing from Trikolorfjellet.

A high coefficient of correlation between electrolytic conductivity and total solids is available for water of Hoglandvatnet and its tributaries, as well as that of Ålandvatnet and its tributaries. Its value is 0.99.

Characteristics of deposits laid down by streams feeding Hoglanvatnet and Ålandvatnet

Hydrochemical properties of Hoglandvatnet, Ålandvatnet and their creeks are closely correlated with lithologic diversity of the surrounding masifs.

The thermal analysis (Fig. 6) of deposits laid down in small morainic lakes between Hoglandvatnet and Framstaken (samples III, IV, V) indicates that

Table 3

Soluble salts contained in deposits laid down in Hoglandvatnet and Ålandvatnet by their tributaries

Sample No.	$\kappa 25°C$ mSm^{-1}	Cations mv · $100^{-1}g^{-1}$				Anions mv · $100^{-1}g^{-1}$		
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^{-}	SO_4^{-}	Cl^{-}
III	10.6	0.30	0.30	0.03	0.07	0.20	0.40	0.10
IV	10.8	0.40	0.15	0.05	0.06	0.30	0.35	0.05
V	8.0	0.10	0.20	0.04	0.07	0.10	0.00	0.05
VI	12.1	0.40	0.20	0.03	0.08	0.40	0.25	0.05
XIII	12.7	0.45	0.15	0.05	0.08	0.25	0.35	0.05
XVII	10.5	0.40	0.05	0.03	0.07	0.20	0.25	0.05
XIX	10.6	0.45	0.15	0.05	0.10	0.40	0.25	0.05
XXIII	10.7	0.45	0.10	0.12	0.04	0.40	0.30	0.05
XXVII	12.4	0.55	0.05	0.05	0.07	0.60	0.00	0.05
XXIX	15.5	0.65	0.10	0.03	0.03	0.50	0.30	0.15
XXXII	10.6	0.55	0.00	0.45	0.06	0.30	0.35	0.10

comparatively large amounts of organic matter occur in addition to silicates. The mass losses are 0.6 to 0.8 per cent for the range of 300—500°C. The carbonate contents of the deposits are low as they make up 3.5 to 5.0 per cent. The chemical composition of soluble salts, especially those consisting of calcium and magnesium in addition to sulphate and bicarbonate anions, shows that magnesium and calcium sulphates are concurrent with calcium carbonate (Tab. 3).

The thermal analysis of deposits laid down in the eastern part of Hoglandvatnet (sample VI) reveals the presence of large amounts of carbonates, *i. e.* 15.9 per cent (TG of 7 per cent at 700—1000°C), in addition to silicates and organic matter (TG of 1.2 per cent at 300—500°C). In soluble salts calcium carbonate and magnesium sulphate are concurrent. The endothermic reaction of magnesium sulphate is concealed throughout thermal analysis as it coincides with the effect of silicate dehydroxylation.

Deposits laid down in Hoglandvatnet (samples XIII, XVII, XIX) and Ålandvatnet (sample XXXII) by streams issuing from snow cover of Trikolorfjellet consist of carbonates in addition to silicates. Their amounts range from 11 to 35 per cent. The asymmetrical endothermic reaction within the temperature range of 700—1000°C indicates the presence of calcium and magnesium carbonates. In soluble salts calcium sulphate and smaller amounts of magnesium sulphate occur in addition to carbonates.

A similar composition in characteristic of deposits laid down in Hoglandvatnet. They are carried from the north-facing slopes of Tarantellen (sample XXIII) across the marginal zone of the McWhaebreen. In these deposits a two-step endothermic reaction produced by carbonate decompo-

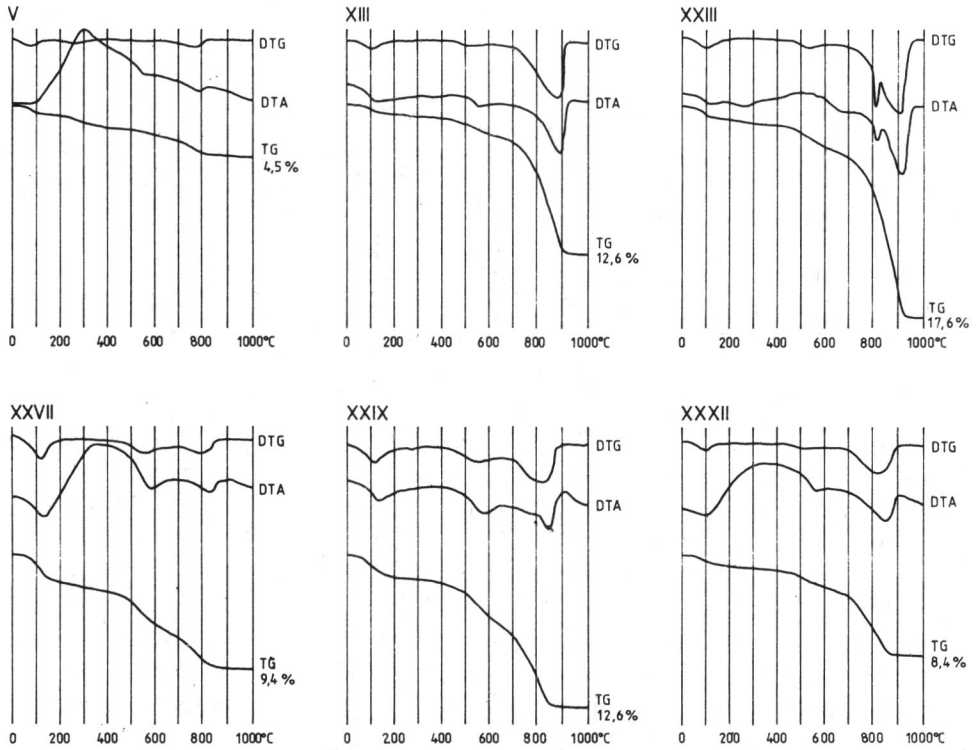

Fig. 6. Derivatograms of deposits laid down by water feeding Hoglandvatnet and Alandvatnet: natural samples

sition is extremely strong. It is indicative of a large proportion of magnesium carbonate.

The thermal analysis of deposits laid down in Alandvatnet and derived from the slopes of Sentinelfjellet (sample XXVII) and the marginal zone of the Cambridgebreen (sample XXIX) reveals the presence of a small amount of carbonates in sample XXVII (4.5%) and a large amount of carbonates in sample XXIX (15.0%) in addition to silicates. Calcium is the main cation occurring in soluble salts, while bicarbonate is the main anion. Soluble salts contained in a deposit removed away from Trikolorfjellet by Cambridgebreen are also composed of substantial quantities of sulphates.

The analysis of sediments deposited in Hoglandvatnet and Alandvatnet by their feeders shows possible effects of lithology of the surrounding massifs on the chemical composition of water. There is a marked effect of Palaeozoic sedimentary rocks of Trikolorfjellet and Tarantellen which serve as the main source of calcium and sulphate ions delivered to the lakes under investigation.

Concluding remarks

The investigations provide data on the properties of the waters of Hoglandvatnet and Ålandvatnet, as well as the correlation between the chemical composition of basin water and lithologic diversity of the surrounding massifs in combination with glacier water feeding the basins.

The waters of Hoglandvatnet have a rather uniform ion composition. They bear sulphates and calcium. The lake is fed by highly mineralized calcium-sulphate water flowing from the west and south and by glacier water rich in bicarbonate, sodium and magnesium ions on the east side. However, low mineral contents of glacier water and that flowing through crystalline rocks of Framstaken result in its lesser effect on the Hoglandvatnet water, compared with highly mineralized creeks flowing from Trikolorfjellet and Tarantellen.

The waters of Ålandvatnet are characterized by a somewhat different quantitative ion composition. They contain calcium, sulphates and bicarbonates. Their slight spatial variations are due to the influence of lake tributaries. In the west they comprise bicarbonate-calcium water of Ålandelva with low mineral contents. The southern portion of the lake is fed by water issuing from Cambridgebreen and Balliolbreen and that flowing from Trikolorfjellet. The waters contain calcium and sulphates, and remain highly mineralized. In the southeast the lake is fed by an intense stream of calcium--sulphate water issuing from Hoglandvatnet. Its mineral contents are somewhat lower than those of Hoglandvatnet. Water issuing from Mittag--Lefflerbreen is delivered to the eastern portion of the lake.

The waters of Ålandvatnet are richer in the bicarbonate ion than the Hoglandvatnet water. It is presumably due to the influence of Ålandelva bicarbonate water and glacier water feeding the basin, as well as a small contribution from highly mineralized calcium-sulphate creeks issuing from Trikolorfjellet.

The analysis of deposits laid down in Hoglandvatnet and Ålandvatnet by their tributaries reveals a marked effect of Palaeozoic sedimentary rocks of Trikolorfjellet and Tarantellen on the chemical composition of lake water which is the main source of calcium and sulphate ions. These dominante the composition of the waters of Hoglandvatnet and Ålandvatnet.

References

Hermanowicz W. 1984. Chemia sanitarna. — Arkady, Warszawa, 455—457.

Markowicz M. and Pulina M. 1979. Ilościowa półmikroanaliza chemiczna wód w obszarach krasu węglanowego. — Uniwersytet Śląski, Katowice, 10—30.

Minczewski J. and Marczenko Z. 1985. Chemia analityczna. — PWN, Warszawa, 536—544.

Stankowski W. 1989 (*this volume*). Interaction of marine, glacial and lacustrine processes throughout morphogenesis of the region between the Billefjorden and Aust-fjorden, Central Spitsbergen. — Pol. Polar Res., 10: 000—000.

Received December 15, 1988
Revised and accepted May 24, 1989

Streszczenie

Zbiorniki Hoglandvatnet i Ålandvatnet związane są genetycznie z działalnością dużego strumienia lodowego Mittag-Leffterbreen, zmierzającego od Łomonosovfonna na północ po Austfjorden (fig. 1 i 2). Przeprowadzone badania pozwoliły na charakterystykę wód Hoglandvatnet i Ålandvatnet oraz na korelację składu chemicznego wód zbiorników z litologiczną różnorodnością otaczających masywów, a także ze składem wód lodowcowych, zasilających te zbiorniki.

Wody Hoglandvatnet charakteryzują się w miarę jednorodnym składem jonowym (tab. 1, fig. 3 i 4). Są to wody siarczanowo-wapniowe. Wody Hoglandvatnet zasilane są ze strony zachodniej i południowej wodami wapniowo-siarczanowymi, silnie zmineralizowanymi. Ze strony wschodniej wodami lodowcowymi bogatszymi w jon wodorowęglanowy oraz w jony sodu liczne Framstaken słabiej wpływa na wody Hoglandvatnet niż silnie zmineralizowane dopływy liczne Framstaken słabiej wpływa na wody Hoglandvatnet niż silnie zmineralizowane dopływy wód z Trikolorfjellet i Tarantellen.

Wody Ålandvatnet charakteryzują się nieco odmiennym składem jonowym, ilościowym niż wody Hoglandvatnet (tab. 2, fig. 3 i 5). Są to wody wapniowo-siarczanowo-wodorowęglanowe. Nieznaczne zróżnicowanie przestrzenne wód Ålandvatnet wynika z wpływu wód zasilających zbiornik. Na zachodzie jeziora są to wody wodorowęglanowo-wapniowe Ålandelvy, o niskim stopniu mineralizacji. Południowa część jeziora zasilana jest wodami lodowców Cambridgebreen i Balliolbreen oraz wodami spływającymi z Trikolorfjellet. Są to wody wapniowo-siarczanowe, silnie zmineralizowane. Na południowym wschodzie jezioro zasilane jest silnym strumieniem wód wapniowo-siarczanowych od Hoglandvatnet, o mineralizacji nieco mniejszej niż wody wypływające z Hoglandvatnet. Wschodnia część jeziora jest zasilana wodami Mittag-Lefflerbreen.

Wody Ålandvatnet są bogatsze w jon wodorowęglanowy niż wody Hoglandvatnet. Jest to prawdopodobnie wynikiem wpływu wodorowęglanowych wód Ålandelvy oraz wód lodowcowych zasilających zbiornik. Jest to też wynikiem mniejszego udziału silnie zmineralizowanych, wapniowo-siarczanowych dopływów z Trikolorfjellet.

Analiza osadów deponowanych w Hoglandvatnet i Ålandvatnet przez ich dopływy podkreśla wyraźny wpływ poleozoicznych skał osadowych Trikolorfjellet i Tarantellen na skład chemiczny wód analizowanych jezior (fig. 6, tab. 3). Są one głównym źródłem jonów wapniowych i siarczanowych stanowiących dominujący składnik wód Hoglandvatnet i Ålandvatnet.